

tion to be evaluated and action to be taken), are sent via an interface (i.e., Interface A and/or Interface B), to a so-called “rule translation engine” 122. In one particular embodiment of the invention, the rule translation engine 122 is embodied in software executed as part of the element management system 120a, 120b, as shown more particularly in FIGS. 1 and 2, where events are aggregated (“Event Aggregation” 124) or “counted”, and which includes the systems and applications for managing the network element(s). Alternately, the rule translation engine 122 can be embodied directly in the network element, for example, in the network element 130c of FIG. 3. Although only one network element is shown in each of FIGS. 1-3, it should be understood that a plurality of network elements 130a, 130b and/or 130c will be present in the network. Similarly, it should be understood that, although only one element management system (EMS) 120a, 120b, 120c is illustrated in each of FIGS. 1, 2 and 3, this is not meant to be limiting, as there can be several EMSs in each of the systems 100a, 100b, 100c. For example, although one EMS manages several network elements (with one network element usually being managed by exactly one EMS), there could be different EMSs for network monitoring/alarming, configuration, etc.

[0028] Referring back to FIGS. 1-3 and 5, the rule translation engine 122 identifies which entity (referred to as “rule execution engine” 126) can detect the triggering event and execute the action. Step 350. The rule translation engine 122 relays the rule to the rule execution engine 126. Step 360. As with the rule translation engine 122, the rule execution engine 126 can be located in, for example, the element management system (see, for example, element management system 120a of FIG. 1) or directly in the network element (see, for example, network elements 130b, 130c of FIGS. 2 and 3, respectively). The rule execution engine 126 monitors for the occurrence of a trigger event occurring with regard to the network element 130a, 130b, 130c (i.e., illustrated by the “event detection” block 132). Step 370. If it is detected that a triggering event occurred, the rule execution engine informs a configuration engine 134, located in the network element 130a and/or 130b and/or 130c, to perform the action described in the associated SON rule (which, in the present example, is a change in configuration of the network element 130a and/or 130b and/or 130c). Step 380.

[0029] Once the change has been successfully performed, the performance of the change is reported via the usual event forwarding mechanisms (i.e., illustrated by “event forwarding” block 136) to one or more of the element management system 120a, 120b or 120c and/or the Big Data system 110, depending on the settings of the event forwarding 136.

[0030] One particular example of a protocol neutral specification for defining and implementing one particular embodiment of the invention will now be provided herebelow, wherein capital letters represent section numbers of specifications. It should be noted, however, that the below example is not meant to be limiting, as similar data for SON rules could be configured in different ways from the given example, without departing from the scope of the present invention.

[0031] L.M.N Information Object Class SONRule

[0032] L.M.N.1 Definition:

[0033] This IOC represents a SON rule.

[0034] L.M.N.2 Attributes:

Attribute name	Support Qualifier	Read Qualifier	Write Qualifier
id	Mandatory	Mandatory	—
triggeringEvent	Mandatory	Mandatory	Optional
triggeredAction	Mandatory	Mandatory	Optional
sonRuleStatus	Optional	Mandatory	Mandatory

[0035] L.M.N.3 Notifications:

[0036] For Creation, Deletion or attributeValueChange.

[0037] L.P.1 Information Attribute Definition and Legal Values

Attribute Name	Definition	Legal Values
id	It identifies uniquely an instance of its object class	String
triggeringCondition	It defines the conditions to be evaluated if the triggering event happens	List of ConditionEvaluations ConditionEvaluations: Sequence of dataDescription, Operator, dataDescription Operator: equal, bigger, smaller, contains etc.
triggeredAction	It describes the action to be taken in case the triggering event happens	List of ConfigurationChanges ConfigurationChange: Sequence of parameterName/parameterValue pairs
sonRuleStatus	It describes whether the rule is currently active or not	active, suspended

[0038] Q.S.1 Operation createSONrule

[0039] Q.S.1.1 Definition:

[0040] This operation allows the establishment of a new SONrule.

[0041] Q.S.1.2 Input Parameters:

Parameter Name	Qualifier	Matching Information	Comment
id	Mandatory	sONRuleTypeModule.sonRuleId	—
triggeringCondition	Mandatory	sONRuleTypeModule.triggeringCondition	—
triggeredAction	Mandatory	sONRuleTypeModule.triggeredAction	—

[0042] Q.S.1.3 Output Parameters:

Parameter Name	Qualifier	Matching Information	Comment
Result	M	sONRuleTypeModule.result	Possible values: success; notUniqueIdentifier; unspecifiedError

[0043] Q.S.1.4 Pre-Condition:

[0044] No such rule exists.

[0045] Q.S.1.5 Post-Condition:

[0046] SONrule is made known to the system, which prepares a possible activation. son RuleStatus is “suspended”. Output parameter result is set to success.